Module 2: Working with Fractions and Mixed Numbers

Example 5: Find the value of \( \frac{5}{3} - \frac{3}{4} \). Write your answer in mixed number format.

\[
\frac{5}{3} - \frac{3}{4} = (5 - 2) + \left( \frac{2}{3} - \frac{3}{4} \right) \quad \text{Subtract the whole number parts and fractional parts separately.}
\]

\[
= 3 + \left( \frac{8}{12} - \frac{9}{12} \right) \quad \text{From the previous step, both fractions are re-written as equivalent fractions with an LCD of 12. Notice that performing the subtraction operation would give us a negative result.}
\]

\[
= 2 + \left( 1 + \frac{8}{12} - \frac{9}{12} \right) \quad \text{In this step, we borrowed a 1 from the whole number part to avoid the negative result.}
\]

\[
= 2 + \left( \frac{12}{12} + \frac{8}{12} - \frac{9}{12} \right) \quad \text{Here we represent the number 1 with an equivalent fraction having an LCD of 12.}
\]

\[
= 2 + \left( \frac{20}{12} - \frac{9}{12} \right) \quad \text{Here we followed the rule for order of operations and worked left to right adding the first two fractions in the previous step.}
\]

\[
= 2 + \left( \frac{11}{12} \right) \quad \text{Subtract both fractions in the previous step.}
\]

\[
= 2\frac{11}{12} \quad \text{Write the final answer in mixed number format.}
\]

Example 6: Evaluate \( \frac{4}{10} + \frac{1}{2} - \frac{3}{5} \). Write your answer in mixed number format.

\[
\frac{4}{10} + \frac{1}{2} - \frac{3}{5} = (4 + 2 - 3) + \left( \frac{1}{10} + \frac{1}{2} - \frac{5}{6} \right) \quad \text{As indicated, add and subtract the whole number parts and fractional parts separately.}
\]

\[
= 3 + \left( \frac{3}{30} + \frac{15}{30} - \frac{25}{30} \right) \quad \text{From the previous step, all fractions are re-written as equivalent fractions with an LCD of 30.}
\]

\[
= 3 + \left( \frac{18}{30} - \frac{25}{30} \right) \quad \text{Here we followed the rule for order of operations and worked left to right adding the first two fractions in the previous step. We can see that performing the subtraction in this step would give us a negative result.}
\]

\[
= 2 + \left( 1 + \frac{18}{30} - \frac{25}{30} \right) \quad \text{Here we borrowed a 1 from the whole number part to avoid the negative result.}
\]

\[
= 2 + \left( \frac{30}{30} + \frac{18}{30} - \frac{25}{30} \right) \quad \text{Here we represent the number 1 with an equivalent fraction having an LCD of 30.}
\]

\[
= 2 + \left( \frac{48}{30} - \frac{25}{30} \right) \quad \text{Again we follow the rule for order of operations and work left to right adding the first two fractions in the previous step.}
\]

\[
= 2 + \left( \frac{23}{30} \right) \quad \text{Subtract both fractions in the previous step.}
\]

\[
= 2\frac{23}{30} \quad \text{Write the final answer in mixed number format.}
\]
As was mentioned earlier, we can first change the mixed numbers to improper fractions before we add or subtract. In some cases this is easier, and in some cases it may be more difficult. In Example 7, we will repeat the problem given in Example 5 using this approach.

Example 7: Find the value of \(5 \frac{2}{3} - 2 \frac{3}{4}\) by first writing the mixed numbers as improper fractions. Write your answer in mixed number format.

\[
5 \frac{2}{3} - 2 \frac{3}{4} = \frac{17}{3} - \frac{11}{4}
\]
Both mixed numbers are re-written as improper fractions.

\[
= \frac{68}{12} - \frac{33}{12}
\]
From the previous step, both fractions are re-written as equivalent fractions with an LCD of 12.

\[
= \frac{68 - 33}{12}
\]
Here we write the difference of the two fractions in the previous step.

\[
= \frac{35}{12}
\]
Here we calculated the difference of 68 and 33. The denominator remains unchanged.

\[
= 2 \frac{11}{12}
\]
To get this result, we perform long division and divide 12 into 35.

\[
= 2 \frac{11}{12}
\]
The result is finally written in mixed number format.

For Exercises 29 – 38, evaluate each expression.

29) \(2 \frac{1}{3} + 1 \frac{1}{4}\)
30) \(3 \frac{7}{8} - 1 \frac{3}{4}\)
31) \(3 \frac{4}{5} + 1 \frac{5}{6}\)
32) \(4 \frac{1}{3} - 2 \frac{4}{7}\)
33) \(6 \frac{7}{8} + 5 \frac{7}{10}\)
34) \(8 \frac{3}{16} - 4 \frac{5}{8}\)
35) \(7 \frac{1}{2} + 6 \frac{9}{10}\)
36) \(11 \frac{3}{4} - 5 \frac{11}{16}\)
37) \(5 \frac{4}{5} + 4 \frac{5}{6} - 6 \frac{2}{3}\)
38) \(2 \frac{2}{3} - 1 \frac{7}{8} + 9 \frac{1}{4}\)

For Exercises 39 – 44, evaluate each expression by first changing the mixed numbers to improper fractions. Write your final answer in mixed number format.

39) \(3 \frac{1}{10} + 2 \frac{3}{8}\)
40) \(4 \frac{5}{6} - 2 \frac{2}{3}\)
41) \(6 \frac{3}{8} + 4 \frac{1}{5}\)
42) \(2 \frac{1}{3} - 1 \frac{1}{4}\)
43) \(6 - 3 \frac{7}{10} + 2 \frac{4}{5}\)
44) \(8 \frac{3}{10} - 5 + 7\)